



# IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Patent Application of

Toshiharu MORI et al.

Application No.: 09/392,264

Filed: September 9, 1999

For: OPTICAL FILTER DEVICE AND  
METHOD OF MAKING SAME (As  
Amended)

Group Art Unit: 2871

Examiner: Kenneth Parker

Confirmation No.: 9910

## REQUEST FOR RECONSIDERATION

Commissioner for Patents  
P.O. Box 1450  
Alexandria, VA 22313-1450

Sir:

In reply to the Office Action dated November 6, 2003, Applicants respectfully request reconsideration of the above-captioned application. The continued indication that claims 3, 6 and 9 contain allowable subject matter is noted with appreciation. Applicants respectfully submit, however, that claims 1, 2, 4, 5, 7, 8, 10-17 and 23-28 also contain allowable subject matter.

The Office Action includes a rejection of claims 1, 2, 4, 5, 7, 8, 10-17, 23 and 24 under 35 U.S.C. §103 as allegedly being unpatentable over IBM Technical Disclosure NN86045000 in view of the Davis et al. patent (U.S. Patent 6,043,861), the Domash patent (U.S. Patent 5,937,115), the Kawano patent (U.S. Patent 6,270,261), and the Hallemeier patent (U.S. Patent 5,889,900); and a rejection of claims 1, 2, 4, 5, 7, 8, 10-17, and 23-28 under 35 U.S.C. §103 as allegedly being unpatentable over the Stotts patent (U.S. Patent 3,909,113) in view of the Hallemeier patent, the Sugihara patent (EP 0608566), the Kyocera patent (JP 1010 4472), the

Kunikane et al. patent (US 5,479,547); the Farakama patent (JP 0902902), NT&T (JP 04069604), the Oki patent (JP 10246825), and the Benzoni patent (US 5,042,889). These rejections are respectfully traversed.

As a general matter, the comments in the Office Action regarding the rejection contain allegations that do not seem particularly relevant to the claimed subject matter. To the degree that the terms and concepts being addressed in the comments are not found in the claims, they are not addressed herein. However, there appears to be some misunderstanding of both the prior art and the present invention.

### **FIRST GROUNDS OF REJECTION**

#### **Primary Reference - The IBM Technical Disclosure**

First, the Examiner has provided an illustration of what he believes the IBM Technical Disclosure shows. Applicants respectfully submit that the illustration in the IBM Technical Disclosure actually shows what the device looks like, i.e., a quartz block shaped like a brick in which a groove is carved for holding a single-mode optical fiber. The single-mode fiber is mounted in the block and the block/fiber combination ground down to the core of the fiber, which is essentially what is shown in the figure. On either side of the block, it would appear that a single-mode fiber would have a circular diameter at portions not contained or attached to the block. However, as illustrated by the Examiner, it appears that the Examiner is under the impression that a block of material is inserted through the optical fiber. Instead, as illustrated and described, a cholesteric liquid crystal layer is formed on the ground down portion so as to promote a diffracted beam to exit at an angle to a normal line on the block face.

Further, it is apparent that the Office views the IBM Technical Disclosure as containing a groove in the optical fibers, but the undersigned could not understand the Examiner's comments regarding how extensive the groove must be in the paragraph bridging pages 5 and 6. It should be noted, however, that claim 1 recites that a filter element includes a liquid crystal layer deposited in a position which divides the optical waveguide layer in a waveguide direction. The waveguide layer is the layer in which light waves are confined. Cladding on one side of the waveguide layer can be air. As illustrated in Figure 1, for example, in the present application, the groove extends all the way through the waveguide layer. This does not create any problems under 35 U.S.C. § 101 or 112 insofar as the construction and operation of the present invention are thoroughly described.

Specifically, a filter element in the form of a liquid crystal layer has a twisted structure in which a helical pitch reflects light of a predetermined wavelength, as illustrated by arrow line B in Figure 1, but can also transmit light, as indicated in the arrow line connecting the optical filter element 5 to a photodiode 11. This feature of the invention as recited in claim 1 is not found in the IBM Technical Disclosure. Very clearly, because of the manner in which the beam is diffracted, the liquid crystal of the IBM Technical Description cannot and does not divide the optical waveguide layer no matter how this layer is defined with respect to including a cladding layer or not. If it did, the device disclosed in the IBM Technical Description would not work as intended.

In terms of claim language, the IBM Technical Disclosure does not include a filter element "disposed in a position which divides said optical waveguide layer". Instead, it is apparent from the written description that the cholesteric liquid crystal

helix is applied to a polished surface of the structure and therefore does not divide a waveguide layer.

Additionally, it is noted that the IBM Technical Disclosure does not disclose a filter that reflects light at a predetermined wavelength, in the waveguide, as recited in the pending claims. Rather, light is diffracted at a predetermined angle.

Applicants respectfully submit that the IBM technical disclosure does not include a majority of the features of the recited optical filter device in claim 1. Claim 12 is even more detailed than claim 1 and it is noted, with respect to independent claim 12, as well as other claims which recite a "groove", the IBM Technical Disclosure does not include this feature either.

It is reiterated that the liquid crystal layer of the IBM Technical Disclosure is disposed along the waveguide direction as shown in the attached drawings. The liquid crystal layer does not divide the wave in a waveguide direction.

### Secondary References

#### The Hallemeier Patent

The Hallemeier patent merely teaches an integrated optical tunable filter which includes polarizers 14 and 16 which are inserted into spaced cuts 32 and 34 which cross a waveguide 12. Hence, even in hypothetical combination, the Hallemeier patent does not teach or suggest a liquid layer having a twisted structure in which the helical path reflects light of a predetermined wavelength acting as a filter element disposed in a position which divides an optical waveguide layer in a waveguide direction.

### The Kawano Patent

The Kawano patent discloses a semiconductor laser module which includes an optical isolator chip 13 which includes a Faraday rotator 1a and polarizing elements 2b on both sides of the Faraday rotator. Hence, the only relevance appears to be the positioning of an optical element within a slot.

### The Domash Patent

The Domash patent is directed to a switchable optical component which includes grooves for waveguides of particular configurations. Again, as with the other art, relevance of the Domash patent is not immediately apparent to the undersigned. However, even in combination with the other applied art, it does not include an optical waveguide and a filter element including a liquid crystal layer disposed in a position which divides the optical waveguide layer in the waveguide direction wherein the liquid crystal layer has a twisted structure which the helical pitch reflects a predetermined wavelength. Element 12 is an electronically switchable Bragg grating and to the reading of the undersigned is not in a groove.

### The Davis Patent

The Davis patent is directed to an optical waveguide that has two cholesteric liquid crystal polymer layers positioned parallel to each other such that when the polymer layers are in an "on" state, the polymer layers reflect white thereby forming a waveguide. However, this structure does not meet the recitations of an optical waveguide layer wherein a filter element including a liquid crystal layer disposed in a position which divides the optical waveguide layer in a waveguide direction, and the liquid crystal layer has a twisted structure in which the helical pitch reflects light of a predetermined wavelength.

Other pending claims share distinctions mentioned above and include other features which further remove the present invention from the prior art. For sake of brevity, further discussion will not be belabored.

## **SECOND GROUNDS OF REJECTION**

### **Primary References - The Stotts Patent**

The Stotts patent is directed to an optical coupler which includes two optical fibers 10, 21 coupled in a cladding 12 and joined by a cholesteric liquid crystal material. The liquid crystal material 11, 22, "couples out" selected wavelengths and polarizations through the cladding 12 as disclosed in column 5, line 43, through column 6, line 10, for instance. Figure 3 is an illustration of another embodiment using a planar or channel type waveguide as the optical path.

The Stotts patent does not disclose or suggest a filter element which includes a liquid crystal layer having a twisted structure in which a helical pitch reflects light of a predetermined wavelength. Again, it appears to only refract the light so that it couples out of the cladding.

### **The Secondary References**

The Hallemeier, Sugihara, Kyocera, Kunikane et al., Farakawa Electric, NT&T and Oki Electric documents are apparently all applied for allegedly teaching the "use of a planar waveguide to support removable elements in the path of a light beam for fiber optic systems was notoriously well known." Even if this is true, this alleged teaching would not supply the necessary instructions or suggestions to modify the Stoffs device to result in a device meeting the present claim combination of claimed features.

For instance, independent claims 1, 12, and 25 recite a liquid crystal layer reflect light of a predetermined wavelength. Neither Stoffs nor the secondary references disclose a liquid crystal layer that reflects light of a predetermined wavelength as meant in the context of the present claims.

Conclusion

It should be apparent from the foregoing discussion that even taken in combination, the applied art does not teach or suggest the present invention. Accordingly, Applicants respectfully request reconsideration and allowance of the above-captioned application.

Should any residual issues exist, the undersigned respectfully requests the Examiner contact the undersigned by telephone to facilitate prompt allowance of the application.

Respectfully submitted,

BURNS, DOANE, SWECKER & MATHIS, L.L.P.

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